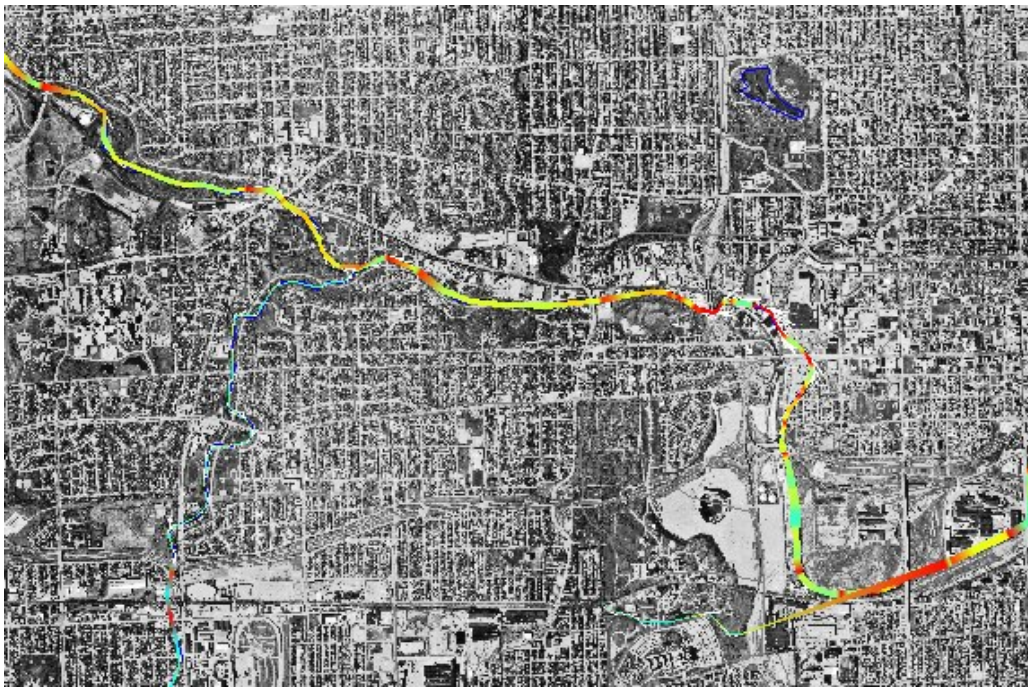
User Manual

Menomonee River Sediment Transport Modeling System



June 6, 2002

I. INTRODUCTION

The following *User Manual* is designed to provide detailed instructions describing how to run the Menomonee River Sediment Transport Modeling System. It is presented in a manner that interested individuals can run and modify the models and review the results in order to make decisions concerning sediment transport in the Menomonee River Watershed. The instructions included are broken into these tasks:

- RUN HSPF IN DOS AND OUTPUT TO DSS FILE
- VIEW HSPF DSS OUTPUT IN HEC-RAS DSS VIEWER
- RUN HSPF IN WINHSPF AND OUTPUT TO WDM FILE
- VIEW HSPF WDM OUTPUT IN GENSCN
- CONVERT HSPF DSS OUTPUT TO HEC-6 INPUT
- RUN HEC-6
- VIEW/PLOT HEC-6 RESULTS IN MICROSOFT EXCEL
- VIEW HEC-6 OUTPUT IN SPATIAL DATA ANALYZER (SDA) BROWSER
- CHANGE LAND USE IN ARCVIEW AND CHANGE IN HSPF
- MODIFY SEDIMENT DATA IN HEC-6 USING SEDIMENT LOADING FUNCTIONS

The flow chart of the system can be found at the end of this user manual and shows the progression of the model system from HSPF input to HEC-6 output. The steps essential for this model system are highlighted with the gray boxes. The additional steps shown allow for additional functionality through the use of several pieces of commercial software including BASINS 3.0, which has been developed by the EPA to incorporate several modeling steps under one umbrella. Though due to some model limitations, BASINS 3.0 is not an essential part of the modeling system, but it does add additional functionality, which may be useful for certain, water quality applications.

II. HARDWARE/SOFTWARE REQUIREMENTS

The Menomonee River Sediment Transport Modeling System was developed on a computer running Windows ME with an 800 MHz Pentium III processor and 384 Mb RAM. The minimum recommended system requirements are:

- Windows 98 or later operating system
- 400 MHz processor
- 128 Mb RAM

System requirements for specific pieces of software are available at the software download site or in their associated user manual.

Because of the thoroughness of this modeling system, several pieces of software are needed to run the entire system. These include:

- ArcView 3.X (purchase at http://www.esri.com/)
- BASINS 3.0 (download at http://www.epa.gov/OST/BASINS)
- *HSPF – Hydrologic Simulation Program FORTRAN v.12 (download at http://www.epa.gov/ceampubl/swater/index.htm)
- *WriteQHEC6 (Baird Menomonee Model CD)
- *HEC6 v.Baird (Baird Menomonee Model CD)
- Microsoft Excel (commercially available)
- SDA Browser (Baird Menomonee SDA CD)
- ArcView GIS extensions:
    - Xtools 6/1/01 (download at http://www.odf.state.or.us/StateForests/sfgis)
- *A text editor such as WordPad, Notebook (included with operating system) or Microsoft Word (commercially available)
- HEC-RAS (for DSS file viewing) or another DSS Viewer (HEC-RAS is available for download at http://www.hec.usace.army.mil/software/software_distrib/hec-ras/hecrasprogram.html)

* Essential modeling system pieces.

III. BAIRD SOFTWARE INSTALLATION INSTRUCTIONS

The following section describes how to install the Baird-developed software included on the Menomonee CD's. Instructions for installing all other required software is available with the programs.

SDA Browser

The SDA Browser software can be installed directly from the Menomonee SDA CD.

1) Open the folder "SDA" and in that, open the folder "Install".
2) Double click on "SETUP.EXE" and follow the installation instructions.

HEC6C v.Baird

Version 4.1.00 of HEC-6 has been modified by Baird to become HEC6C v. Baird. This new version allows for a greater number of cross sections, local inflows and stream segments. The executable file for this program is available on the Menomonee CD in the "HEC6" folder and it called HEC6C.EXE.

1) Copy this file from the CD to any folder on your hard drive.
2) Run the program by double clicking on the .EXE file.

WriteQHEC6

All files needed to run WriteQHEC6 are located on the Menomonee CD in the folder "HSPF to HEC6".

1) Copy this folder to your hard drive and follow the instructions given in this USER MANUAL to run the program.

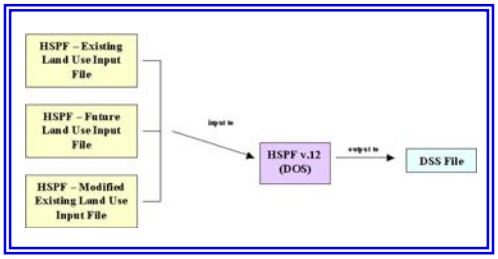
Menomonee River GIS

To view and use the Menomonee River GIS developed for this project, the following steps must be done:

1) Install ArcView 3.X on your computer.
2) Install BASINS 3.0 on your computer.
3) Copy the file, "MR_GIS.apr", located on the CD in the GIS folder; to the folder "c:/BASINS/apr" on your computer's hard drive.
4) Copy the "04040003" folder to the folder "c:/BASINS/Data" on your hard drive.

The GIS can then be opened by either double-clicking on the MR_GIS.apr file or opening that same file from within ArcView.

IV. RUN HSPF IN DOS AND OUTPUT TO DSS FILE


HSPF – Existing Land Use Input File
HSPF – Future Land Use Input File
HSPF – Modified Existing Land Use Input File
HSPF v.12 (DOS)
DSS File

These instructions describe how to run an existing HSPF input file in the DOS version of HSPF and output flow data to a DSS file.

Step 1: Open "EXISTING.UCI", which is located on the Menomonee CD in the "HSPF" folder, in a text editor, such as WordPad. This is a HSPF input file that has been created by Baird and reflects information for 1995 land use. Future and ultimate conditions land uses have also been developed and can be run in the same way as the existing file.

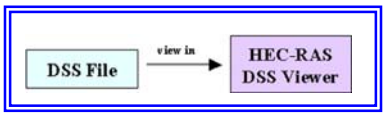
Step 2: Save this file to the folder on your hard drive where you have installed the HSPF program. Also be sure to save the corresponding .WDM (i.e. EXISTING.WDM) to the same folder.

Step 3: Run the HSPF program.

Step 4: The program will ask for the name of the input file; enter the filename and hit enter.

The HSPF input files developed by Baird are designed to output flow data at specific locations to a DSS file. These flow locations correspond to the inflows required in the HEC-6 model developed by Baird. Information regarding the DSS file concept can be downloaded from: http://www.hec.usace.army.mil/publications/pubs_distrib/dss/hecdss.html.

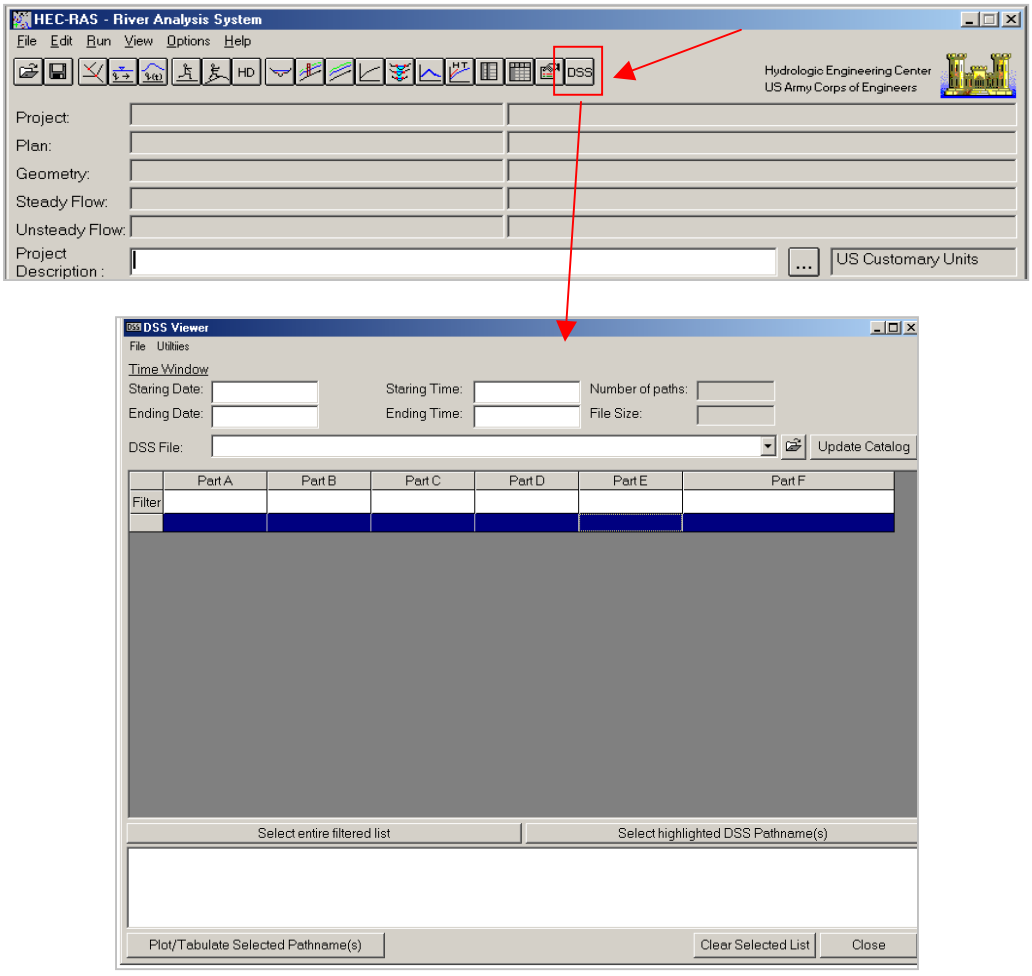
V. VIEW HSPF DSS OUTPUT IN HEC-RAS DSS VIEWER



The DSS flow file created by HSPF can be viewed using any DSS file viewer. HEC-RAS contains a DSS Viewer that can be used to plot and view multiple time-series. These instructions will demonstrate how to use the HEC-RAS DSS viewer to view the HSPF flow data in the DSS files.

Step 1: Open HEC-RAS. (HEC-RAS must be installed on your computer to use this program.

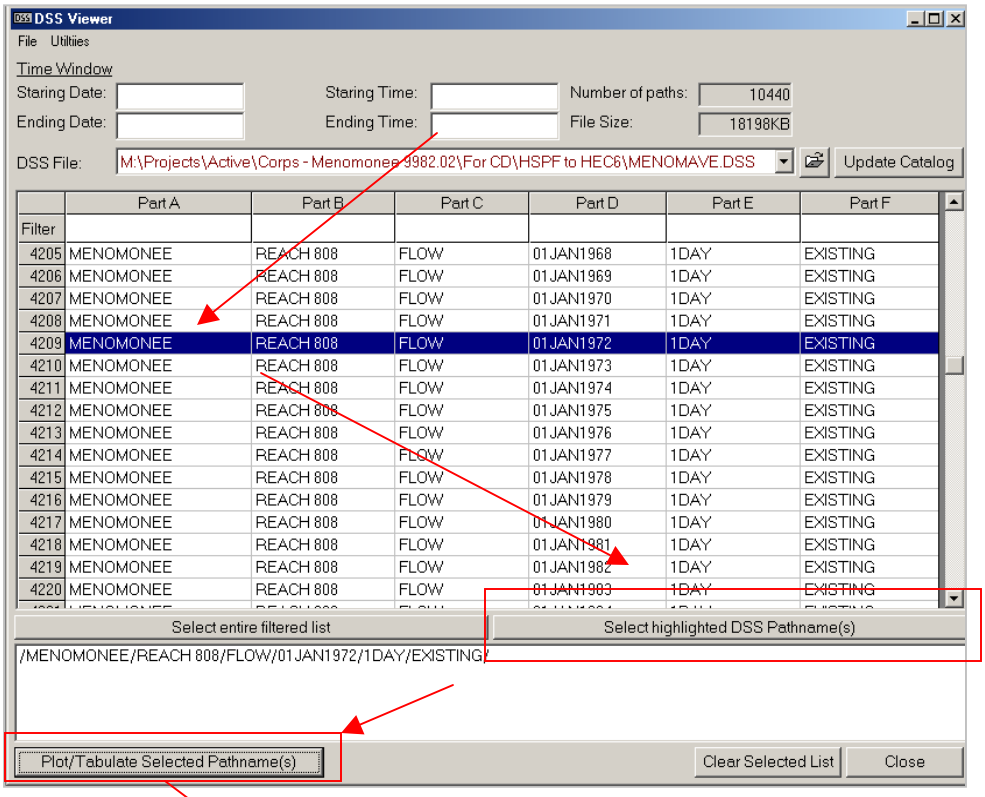
Step 2: Open the DSS Viewer in HEC-RAS by clicking on the DSS button.

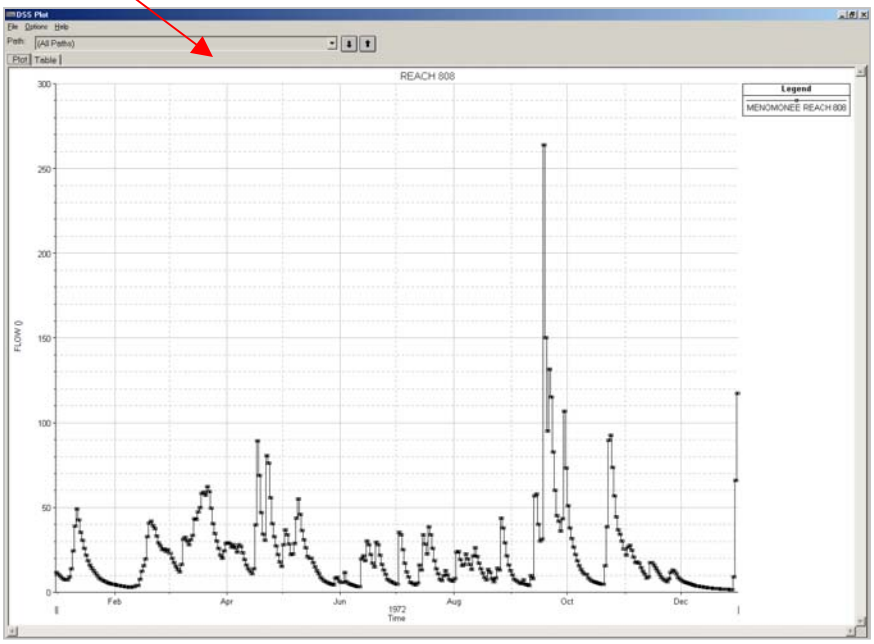


Step 3: Select **File**, **Open** from the menu bar and open the desired DSS file, MENOMAVE.DSS. This DSS file has been created by Baird and contains daily

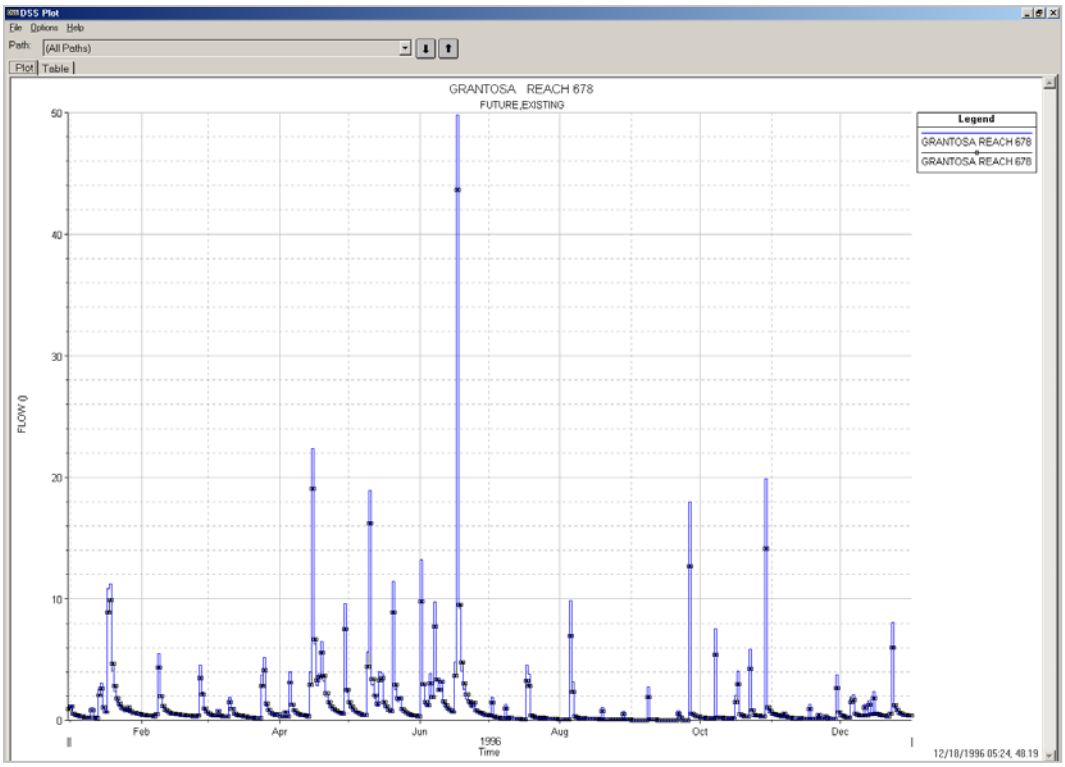
averaged flow data from HSPF for each of the following land use scenarios: existing, future and ultimate conditions.

Step 4: Select time-series to plot by clicking on the time-series, clicking on "Select highlighted DSS Pathname(s)" and clicking "Plot/Tabulate Selected Pathname(s)."


DSS Viewer
File Utilities
Time Window
Staring Date:
Staring Time:
Number of paths: 10440
Ending Date:
Ending Time:
File Size: 18198KB
DSS File: M:\Projects\Active\Corps - Menomonee 9982.02\For CD\HSPF to HEC6\MENOMAVE.DSS
Update Catalog
Part A Part B Part C Part D Part E Part F
Filter
4205 MENOMONEE REACH 808 FLOW 01JAN1968 1DAY EXISTING
4206 MENOMONEE REACH 808 FLOW 01JAN1969 1DAY EXISTING
4207 MENOMONEE REACH 808 FLOW 01JAN1970 1DAY EXISTING
4208 MENOMONEE REACH 808 FLOW 01JAN1971 1DAY EXISTING
4209 MENOMONEE REACH 808 FLOW 01JAN1972 1DAY EXISTING
4210 MENOMONEE REACH 808 FLOW 01JAN1973 1DAY EXISTING
4211 MENOMONEE REACH 808 FLOW 01JAN1974 1DAY EXISTING
4212 MENOMONEE REACH 808 FLOW 01JAN1975 1DAY EXISTING
4213 MENOMONEE REACH 808 FLOW 01JAN1976 1DAY EXISTING
4214 MENOMONEE REACH 808 FLOW 01JAN1977 1DAY EXISTING
4215 MENOMONEE REACH 808 FLOW 01JAN1978 1DAY EXISTING
4216 MENOMONEE REACH 808 FLOW 01JAN1979 1DAY EXISTING
4217 MENOMONEE REACH 808 FLOW 01JAN1980 1DAY EXISTING
4218 MENOMONEE REACH 808 FLOW 01JAN1981 1DAY EXISTING
4219 MENOMONEE REACH 808 FLOW 01JAN1982 1DAY EXISTING
4220 MENOMONEE REACH 808 FLOW 01JAN1983 1DAY EXISTING
Select entire filtered list
Select highlighted DSS Pathname(s)
/MENOMONEE/REACH 808/FLOW/01JAN1972/1DAY/EXISTING/
Plot/Tabulate Selected Pathname(s)
Clear Selected List
Close

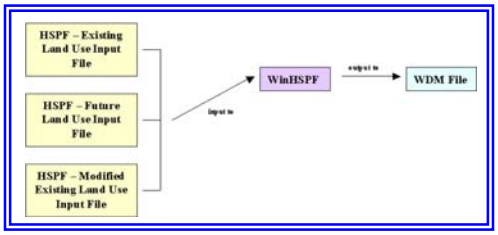


Step 5: Additional time-series can be plotted by selecting more than one in the list. Also time-series for difference land use scenarios can be plotted together for comparison by selecting the same location (Part B) and different scenario (Part F).



More information about the DSS viewer within HEC-RAS can be found in the HEC-RAS user manual, which can be downloaded at: http://www.hec.usace.army.mil/publications/pubs_distrib/hec-ras/user/user.html.

VI. RUN HSPF IN WINHSPF AND OUTPUT TO WDM FILE

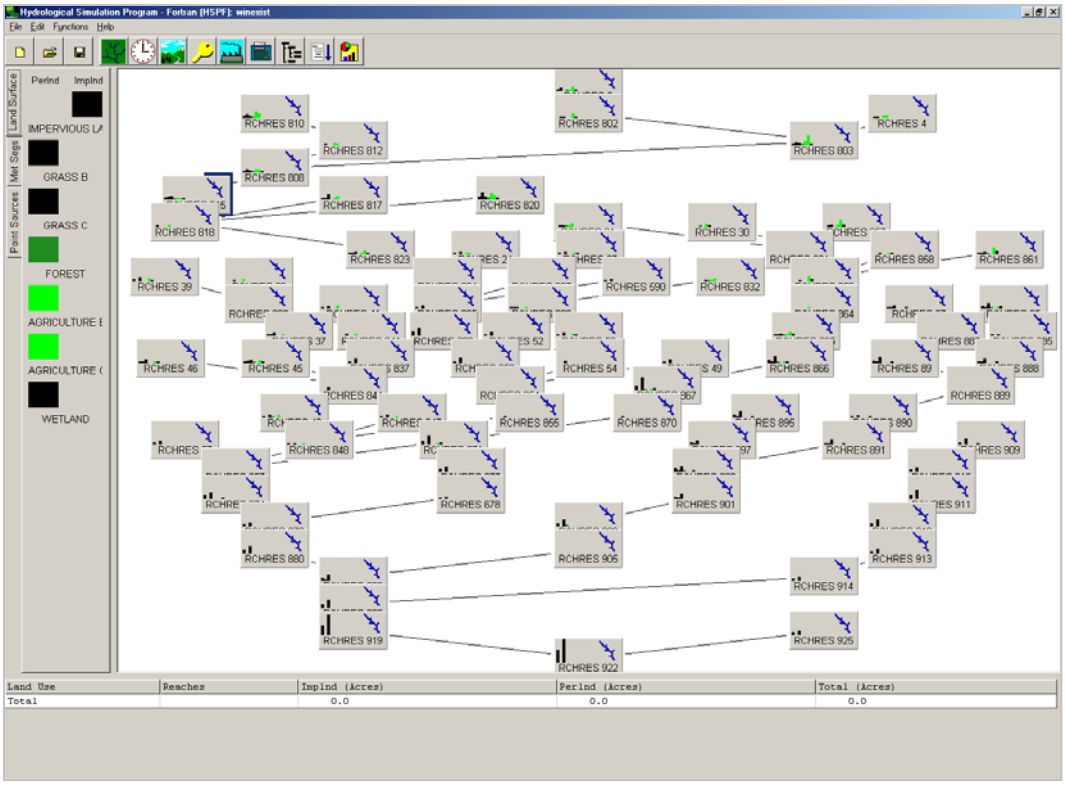

HSPF – Existing Land Use Input File
HSPF – Future Land Use Input File
HSPF – Modified Existing Land Use Input File
WinHSPF
WDM File

Although the user must run the DOS version of HSPF to output to a DSS file, one may want to a more user-friendly Windows version of HSPF called WinHSPF. WinHSPF has been developed as part of BASINS 3.0 and can be run from within BASINS 3.0 or on its own. It allows the user to modify all sections of the HSPF input file in a Windows environment instead of in a text editor. The following instructions will demonstrate how to open an HSPF input file in WinHSPF,

modify it, run it, and output to a WDM data file (WinHSPF does not have the capability of outputting to DSS files.)

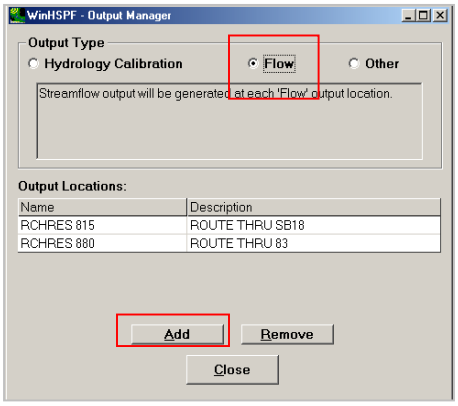
Step 1: Open WinHSPF. This can be done by running the program from the Start menu of your computer or by selecting **Models**, **HSPF** from the menu bar in BASINS 3.0.

Step 2: Open WinExist.uci by selecting **File**, **Open** from the menu bar and browsing to the folder containing the HSPF input files. (WinHSPF will not open HSPF input files that contain the DSS output commands; therefore, Baird has developed HSPF input files for use within WinHSPF.)



Step 3: To set flow output locations, select **Functions**, **Output** from the menu bar or click the Output Manager button (3rd from right).

Step 4: Select the flow option at the top of the Output manager dialog box and click the "Add" button to add flow outputs.



Step 5: Select the desired reach location (RCHRES) for flow output and click the "OK" button.

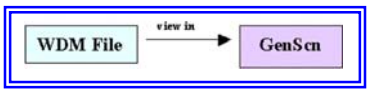
Step 6: To remove a flow output location, select the location and click the "Remove" button from the Output Manager dialog box.

Step 7: To make additional modifications of the input data, click **Edit** from the menu bar and select the section you wish to modify.

Step 8: To run HSPF, select **Functions**, **Run** from the menu bar or click the Run button (2nd from right).

Additional information regarding the use of WinHSPF can be found in the WinHSPF user manual, which is included in the download of WinHSPF with BASINS 3.0.

VII. VIEW HSPF WDM OUTPUT IN GENSCN

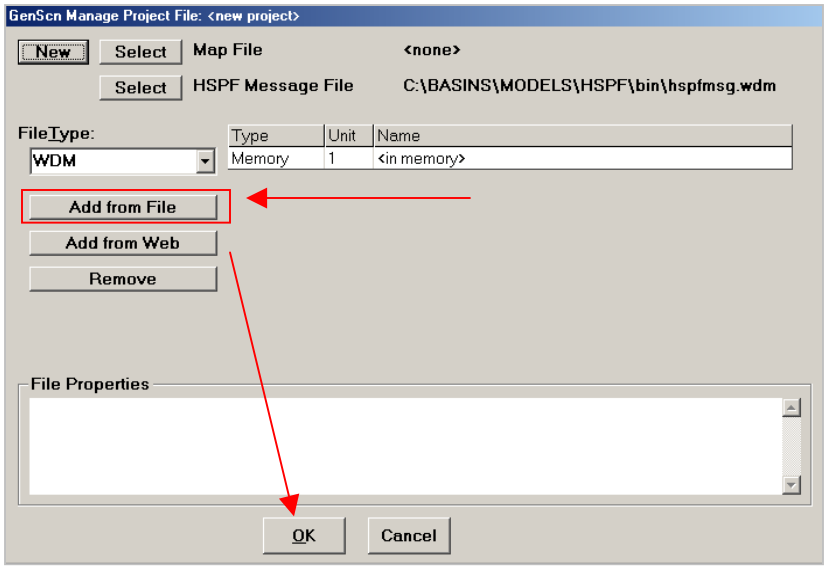


To view HSPF data in WDM files, the program GenScn can be used. GenScn is a postprocessor of model data and is included with BASINS 3.0. It allows the user to visualize, analyze, and compare results from HSPF through the use of WDM files.

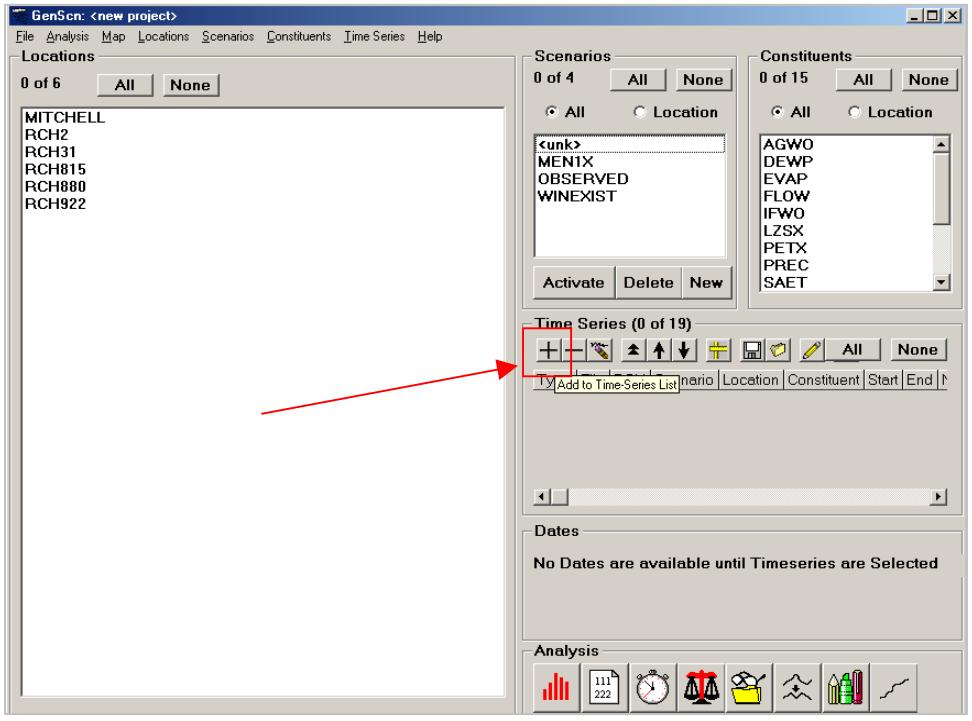
Step 1: Open GenScn from your computer's Start menu or from within BASINS by selecting **Data**, **GenScn** from the menu bar.

Step 2: Select **File**, **New Project** from the GenScn menu bar.

Step 3: Click the "Add from File" button and choose the WDM file (EXISTING.WDM) to view in GenScn. Add more than WDM file if desired. Existing and future land use scenario results can be viewed together by adding both WDM files.



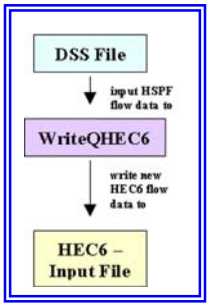
Step 4: To list the time-series in the WDM file, click the "Add to Time-Series List" button.



Step 5: Select one or more time-series from the list and click the "Generate Graphs" button, located on the bottom of the window (left-most button under Analysis). Adjust the start and end dates as desired.

For more information regarding GenScn view the user manual which is included in the download of GenScn with BASINS 3.0.

VIII. CONVERT HSPF DSS OUTPUT TO HEC-6 INPUT



This step of the modeling procedure involves the conversion of the flow data, generated by the HSPF model, and the insertion of the converted data into a HEC-6 data file. One key assumption in performing this conversion is that the HSPF model has successfully written the time-series flow data to a HEC-DSS file, which is explained in Section I of this User Manual. The conversion program, which has been developed by Baird, pulls data out of the DSS file and will insert the flow data into a user-specified HEC-6 input file. The conversion program, called WRITEQHEC6.EXE, runs in DOS mode and has an accompanying DOS batch file for ease of use.

Step 1: Open the file "Menom.inp", which is located on the Menomonee CD in the folder "HSPF to HEC6", in any text-editing program (i.e., WordPad, Notebook, Microsoft Word, etc.) This script file contains a number of non-executable comment lines, which are preceded by an asterisk. These comments are included to describe the data input.

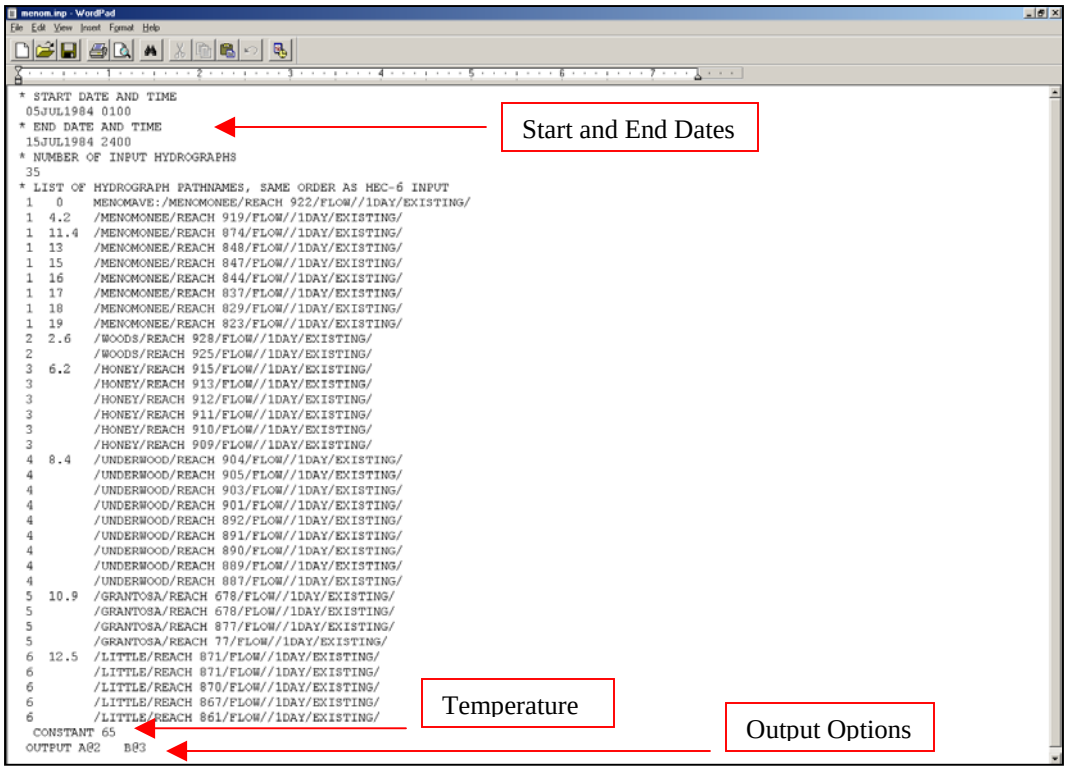
Step 2: Modify the start date and end date to reflect the period of data desired for the HEC-6 model. Be sure to retain the correct date/time format.

Step 3: Modify DSS pathnames only if altering the flow locations in HEC-6 or changing the land use scenario. The DSS information is relatively permanent for most modeling scenarios. The only input that can be easily changed is the land conditions scenario. The DSS file "MENOMAVE.DSS" contains hydrographs for three land use conditions: existing (year 1995), future (year 2020), and ultimate (fully urbanized). To change the land use scenario, the sixth, or "F" part of the DSS pathname should be changed to "existing", "future" or "ultimate", depending on the desired scenario.

Step 4: Modify constant water temperature (65), if desired. If a variable temperature is desired, the user can model temperature variations by editing the final HEC-6 input file.

Step 5: The last line of this file allows the user to change how often HEC-6 outputs both hydraulic and sediment information through the use of the A and B letters. Modify the numbers after each "@" sign to tell the program to include the letter every "#" time step. For example if the user chooses A@3 B@2, the A will be printed every 3rd time step and the B will be printed every 2nd time step and thus when the HEC-6 program is run, it will output hydraulic information every 3rd time step and sediment information every 2nd time step. Additional information regarding the HEC-6 output options can be found in the HEC-6 User Manual, Appendix A, Part 3 which is available for download at http://www.hec.usace.army.mil/software/software_distrib/hec-6/hec6program.html.

Step 6: Save the .inp file with any changes made.



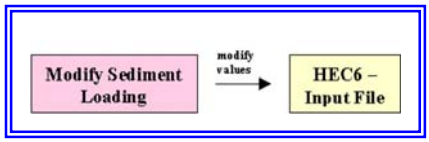
Step 7: Open "writeq.bat" with a text editor. This file is located on the Menomonee CD in the "HSPF to HEC6" folder. This file contains only one line of text as seen below:

WRITEQHEC6 I=MENOM.INP B=XXX.BAS H=XXX.DAT

where I is the input file for WRITEQHEC6, B is the template HEC-6 input file, and H is the new HEC-6 file to be created. It should be noted that the program is designed to create a new HEC-6 file, and will not overwrite an existing template file.

Step 8: Alter the input file name (.inp file), template HEC-6 file or new HEC-6 filename as needed.

IX. RUN HEC-6



The Baird HEC-6 program must be installed/copied to your hard drive before running HEC-6.

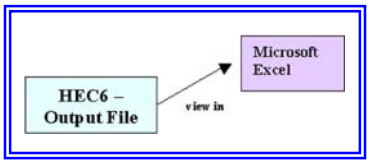
Step 1: Save the HEC-6 .dat file you would like to run to the same folder the HEC-6 program is in.

Step 2: Double click on the HEC6C.EXE file to run HEC-6.

Step 3: Enter the input and output file names as prompted. (Select "no" when prompted about creating additional output files – they are not necessary)

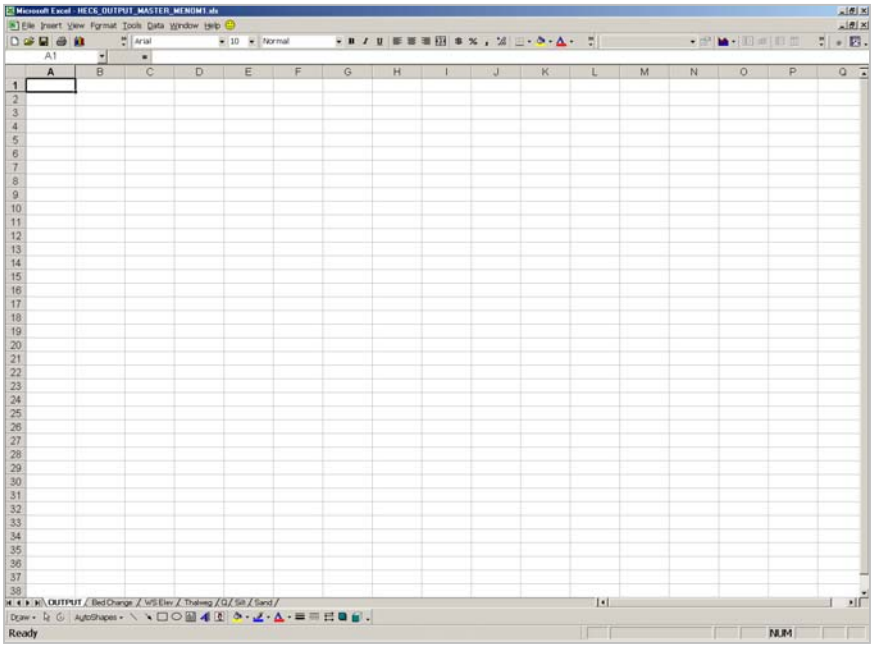
Step 4: A HEC-6 output file will be created when the program is run. The output format will depend on the type of output that was specified in the input file's flow data (AB, etc.) The output options were discussed in the instructions for converting HSPF to HEC-6.

X. VIEW/PLOT HEC-6 RESULTS IN MICROSOFT EXCEL



These instructions explain, step-by-step, how to view and plot HEC-6 results including, bed change, water surface elevation, thalweg, flow, and silt, sand and clay loads for each cross section for every output time step. Because of line limits in Excel, HEC-6 should be run with only the B output, to decrease the overall size of the file and increase the number of time step data that can be read into Excel at one time.

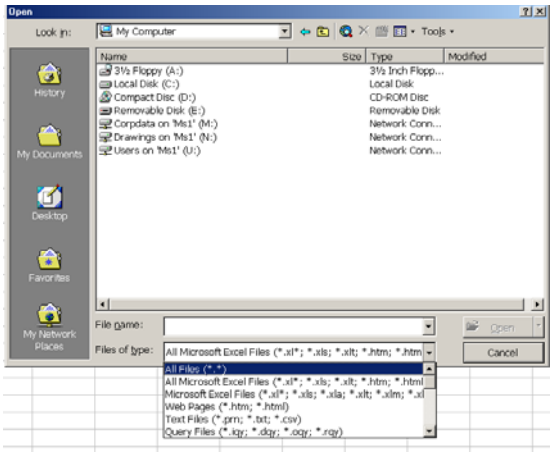
Step 1: Open HEC6_OUTPUT_MASTER_MENOM.xls in Microsoft Excel



Step 2: Open the HEC-6 output file (.out) using Excel.

a. In Excel, choose **File**, **Open** from the menu bar.

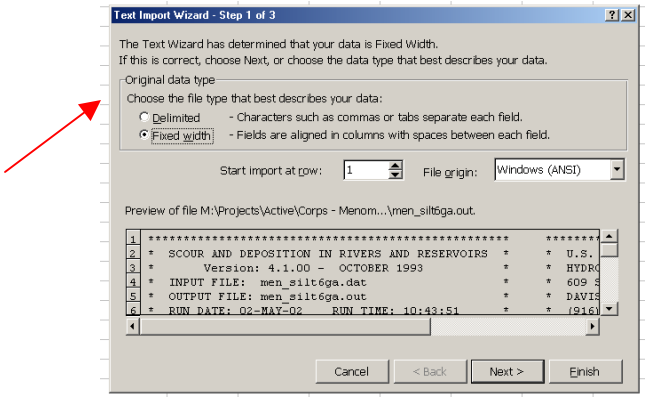
b. At the bottom of the Open dialog box, change the field of Files of Type: to All Files.



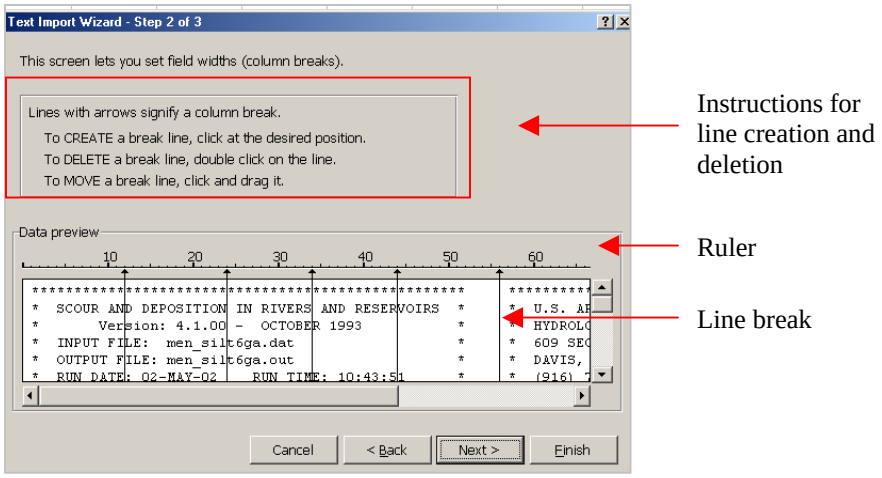
c. Browse to folder containing the HEC-6 output file.

d. Select the desired output file and click **Open.**

e. Text Import Wizard will appear.

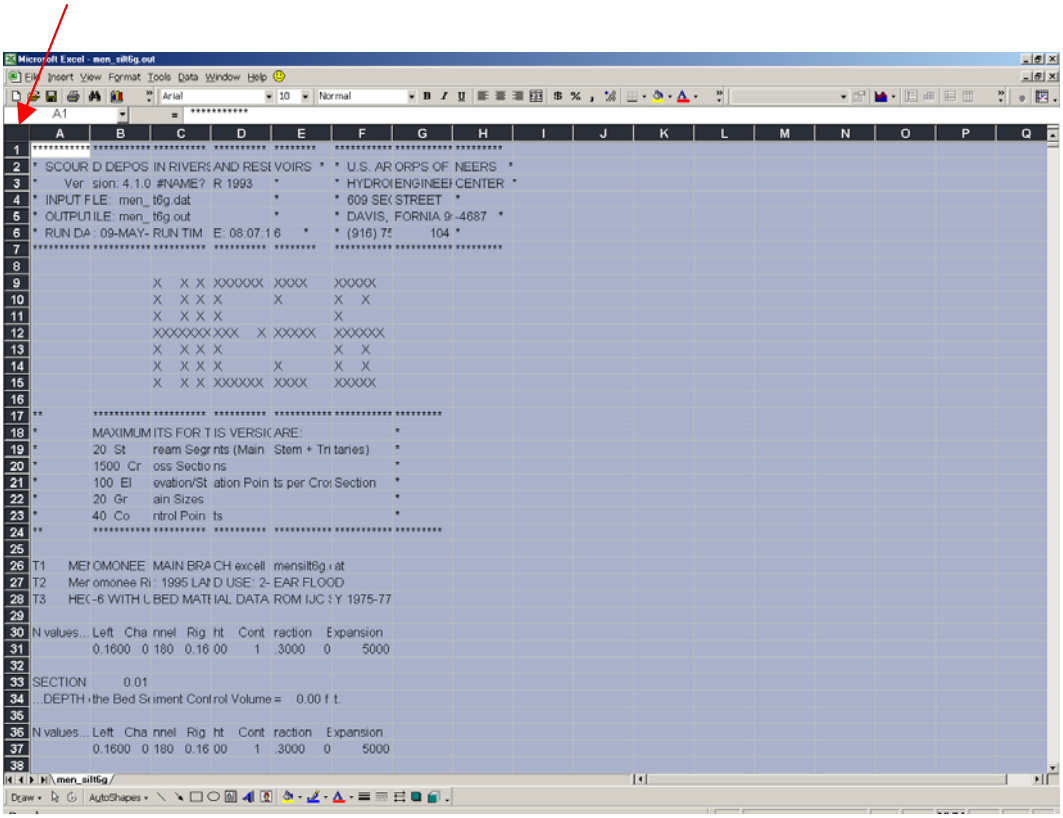

Text Import Wizard - Step 1 of 3
The Text Wizard has determined that your data is Fixed Width.
If this is correct, choose Next, or choose the data type that best describes your data.
Original data type
Choose the file type that best describes your data:
Delimited - Characters such as commas or tabs separate each field.
Fixed width - Fields are aligned in columns with spaces between each field.
Start import at row:
1
File origin:
Windows (ANSI)
Preview of file M:\Projects\Active\Corps - Menom...\men_silt6ga.out.
1 **********
2 * SCOUR AND DEPOSITION IN RIVERS AND RESERVOIRS *
3 * Version: 4.1.00 - OCTOBER 1993 *
4 * INPUT FILE: men_silt6ga.dat *
5 * OUTPUT FILE: men_silt6ga.out *
6 * RUN DATE: 02-MAY-02 RUN TIME: 10:43:51 *
Cancel
< Back
Next >
Finish

f. Make sure **Fixed Width** is selected.
g. Click the **Next** button.
h. Create line breaks at the following ruler positions only: 12, 24, 34, 44, 56, 71, 83, 96 (following instructions given in Excel for line creation and deletion). Use the horizontal scroll bar to add the line breaks at 71, 83 & 96. Click **Next** when finished.


Text Import Wizard - Step 2 of 3
This screen lets you set field widths (column breaks).
Lines with arrows signify a column break.
To CREATE a break line, click at the desired position.
To DELETE a break line, double click on the line.
To MOVE a break line, click and drag it.
Data preview
10
20
30
40
50
60
SCOUR AND DEPOSITION IN RIVERS AND RESERVOIRS
Version: 4.1.00 - OCTOBER 1993
INPUT FILE: men_silt6ga.dat
OUTPUT FILE: men_silt6ga.out
RUN DATE: 02-MAY-02 RUN TIME: 10:43:51
Cancel
< Back
Next >
Finish
Instructions for line creation and deletion
Ruler
Line break

i. At the next diaglog box, click **Finish**.
j. If the output file is too long for Excel (>65336 lines) it will be truncated and the complete output file will not be loaded into Excel.

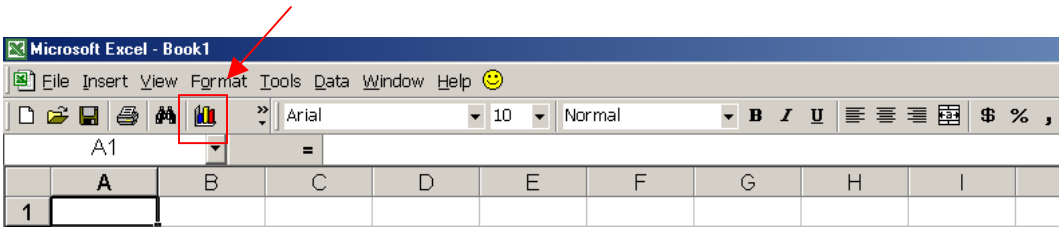
Step 3: Copy entire Excel worksheet with the HEC-6 output by selecting all rows and columns (this can be done by clicking in the cell above row 1 and left of column A)



Step 4: **Copy** (CTRL-C) selected area to clipboard.
Step 5: **Paste** into OUTPUT worksheet of HEC6_OUTPUT_MASTER_MENOM.xls
Step 6: From the **Tools** menu, select **Macro** and click **Macros…**
Step 7: Select "RunXTimes".
Step 8: Click Run

This macro will extract all relevant HEC-6 output data from the output file and put them in columns for each time step up to 27 time steps (if there are more or less time steps for which data is to be extracted, the macro can be modified to reflect any number of time steps). The values for every cross section are listed. The order of the data is: Little Menomonee, Grantosa, Underwood, Honey, Woods, Main Stem.

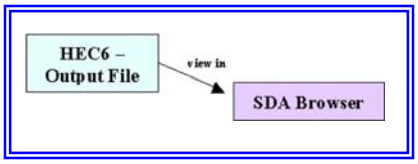
Step 9: To plot results, select data to be plotted and click on Plot button (normal Excel procedure)



Step 10: Once data has been extracted, be sure to save the file under a different name so as to keep the MASTER file clean.

NOTES: **These instructions and associated files are designed specifically for the Menomonee River Watershed and the HEC-6 file developed by Baird. Also, the macro RunXTimes will only run an already specified number of times. To run for more or less than 27 time steps, modification of the X variable value in the macro is required.**

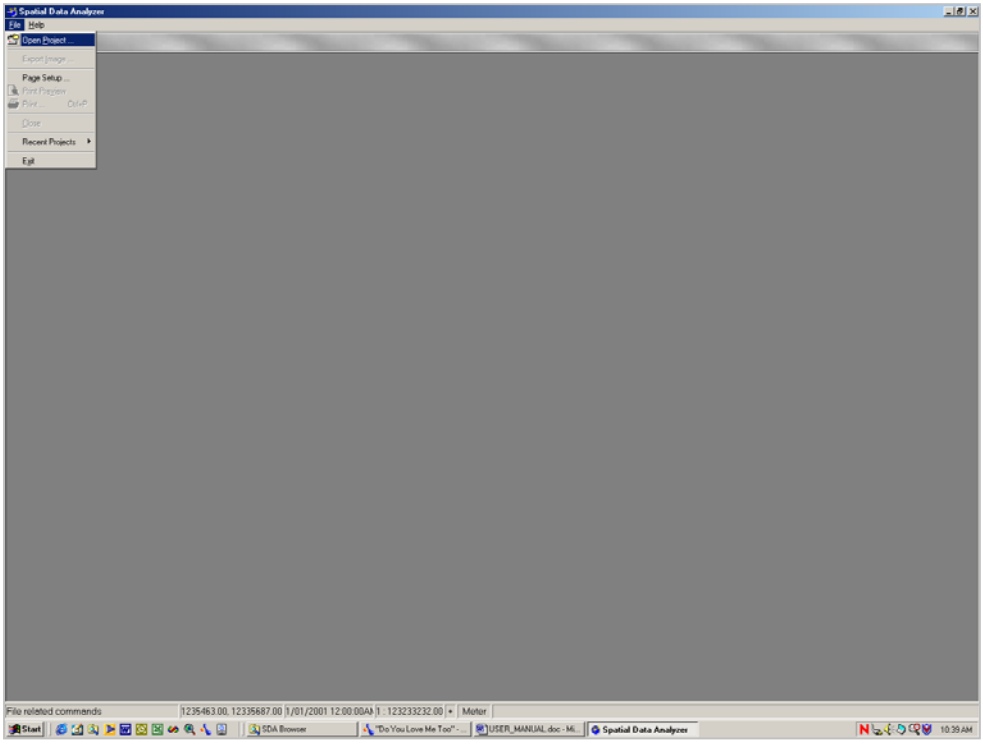
XI. VIEW HEC-6 OUTPUT IN SPATIAL DATA ANALYZER (SDA) BROWSER



These instructions explain how to view HEC-6 output data in SDA.

Step 1: Open SDA Browser. SDA Browser must have already been installed on your machine to use this program.

Step 2: From the **File** menu, select **Open Project**.



Step 3: Select desired project file, MenomoneeSDA.prj, from the "SDA" "Project" folder and click **Open**.
Step 4: Refer to following graphic for tool options.

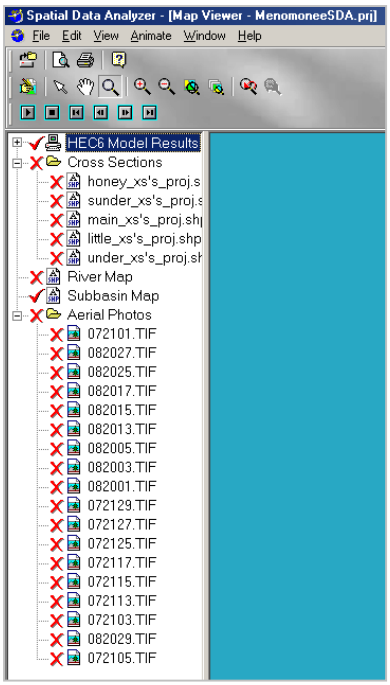
1
2
3

Row 1
Open Project
Print preview
Print
Help

Row 2
Change layer properties
Clear mouse action
Move
Zoom by area
Zoom in
Zoom out
Zoom to extent of selected layer
Zoom to map extent
Undo last zoom
Restore last undo of zoom

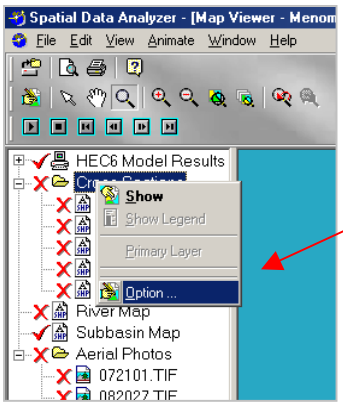
Row3
Play
Stop playing
Rewind to the beginning
Step backwards
Step forwards
Go to the end

Step 5: Refer to the following graphic for layer options



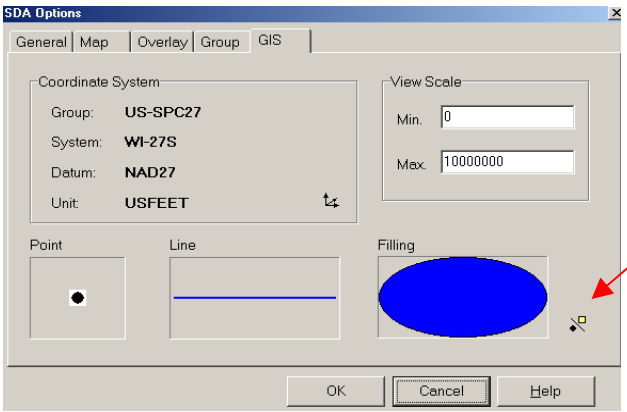
A check means the layer is turned on, an x means it is off.

Folders represent groups. Layers in a group can be turned on and off together or individually.



Right click on a layer or group and click **Option…** to modify its properties

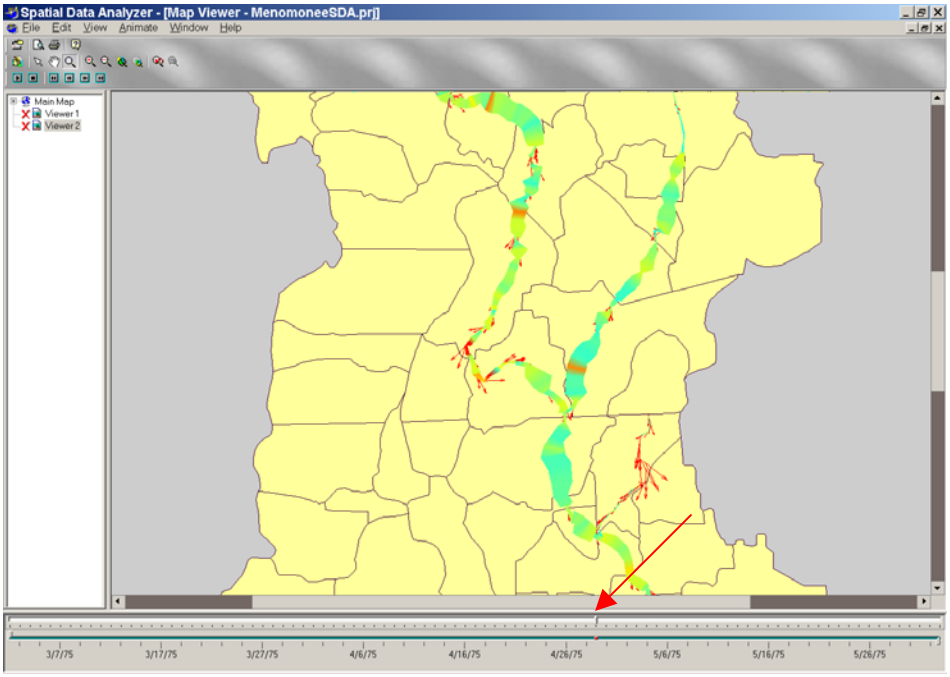
Step 6: Refer to the following graphic for layer property modifications.



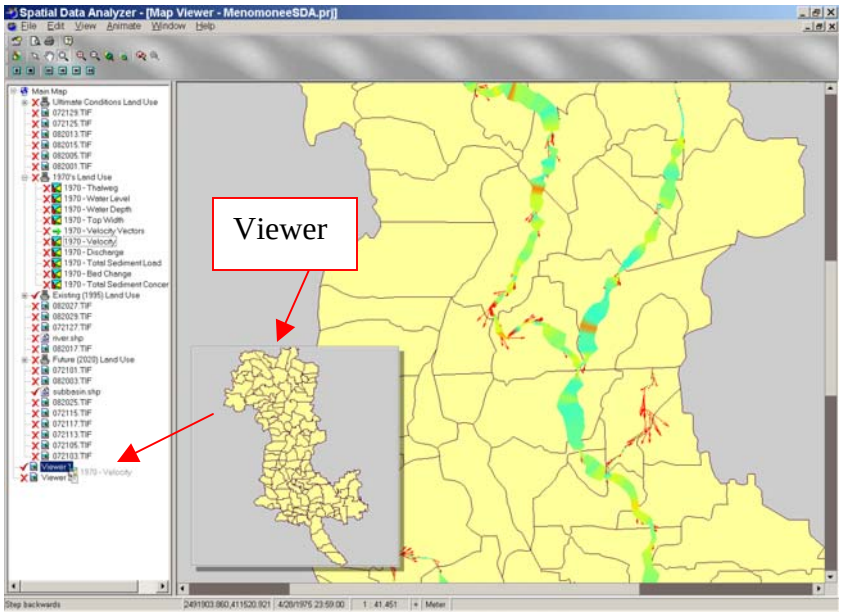
Click here to modify point, line and fill properties

Step 7: To view animated data, from the menu bar, select **View**, **TimeBar**. This opens the time bar which shows the temporal extent of the model data selected.

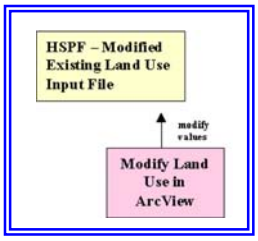
Step 8: To play the time-series, click on the play button or select **Animate**, **Play** from the menu bar. The time series can be played manually by clicking on the selector on the time bar (shown below) and moving to the desired date.



Step 9: The additional viewers (windows) can be resized and turned on and off as desired. To display data in those viewers, simply click on a data layer and drag it to the viewer in the data controller (left side).



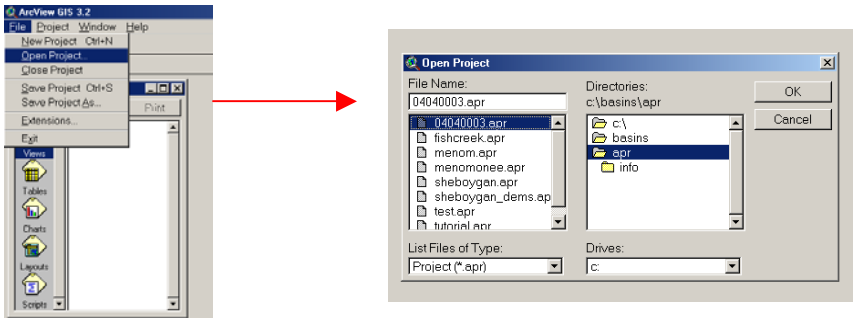
XII. CHANGE LAND USE IN ARCVIEW AND CHANGE IN HSPF



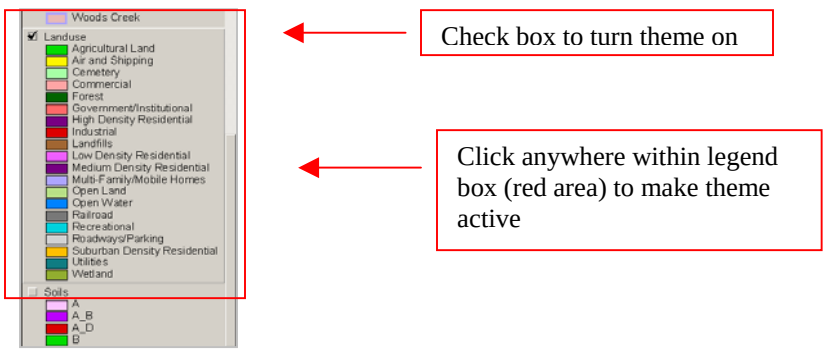
The land-use values in the HSPF hydrologic model can be changed in two different ways. First, to model a particular land use scenario, one of three already compiled HSPF input files can be run. Baird has developed HSPF input files for three different land use scenarios: existing, future and ultimate conditions. Thus, to run a different land use scenario, one needs only run a different HSPF input file. If a more customized land use scenario is desired, the existing land use layer in ArcView/BASINS can be modified and the new HSPF parameters will be calculated for insertion into HSPF. The following instructions outline, step-by-step, how to modify the existing land use within ArcView/BASINS and output the new HSPF parameters.

Step 1: Open ArcView 3.X.

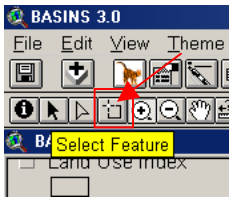
Step 2: Open the Menomonee ArcView/BASINS project (04040003.apr) file.

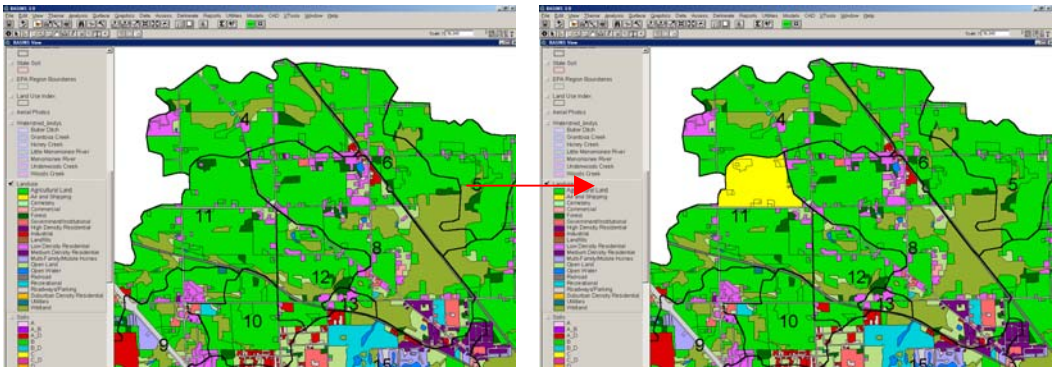


Step 3: Turn on the land-use theme by checking its box and make it the active theme by clicking on the title, Landuse (you can tell the theme is active because its legend box appears raised).

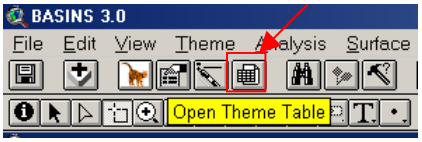


Step 4: Use the "Select Feature" tool to select (highlight) land use areas to be modified.

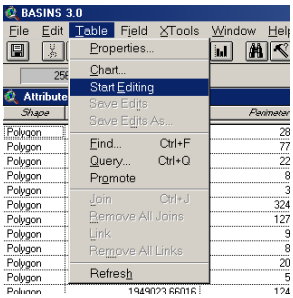




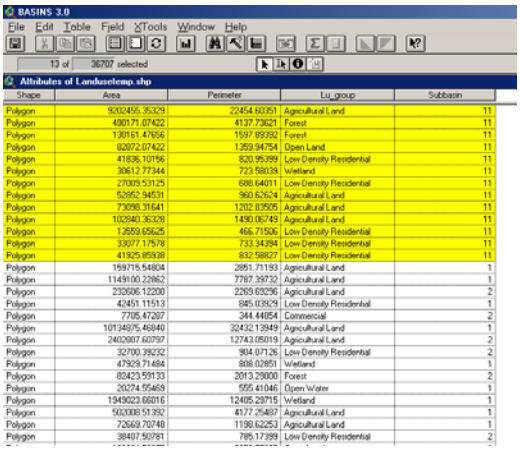
Step 5: Open the "Landuse" theme table by clicking on the "Open Theme Table" button.



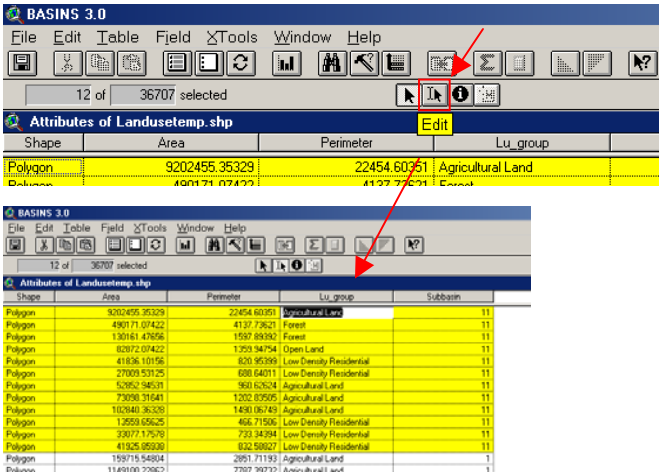
Step 6: Select **Table**, **Start Editing** from the menu bar.



Step 7: Select **Table**, **Promote** from the menu bar. This will cause all the records corresponding to the selected areas to be moved to the top of the table.



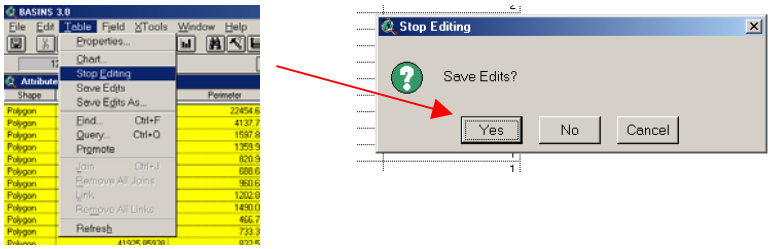
Step 8: Change the values in the Lu_group field to the desired land use categories (see list for categories) by selecting the Edit tool then clicking on the text to change



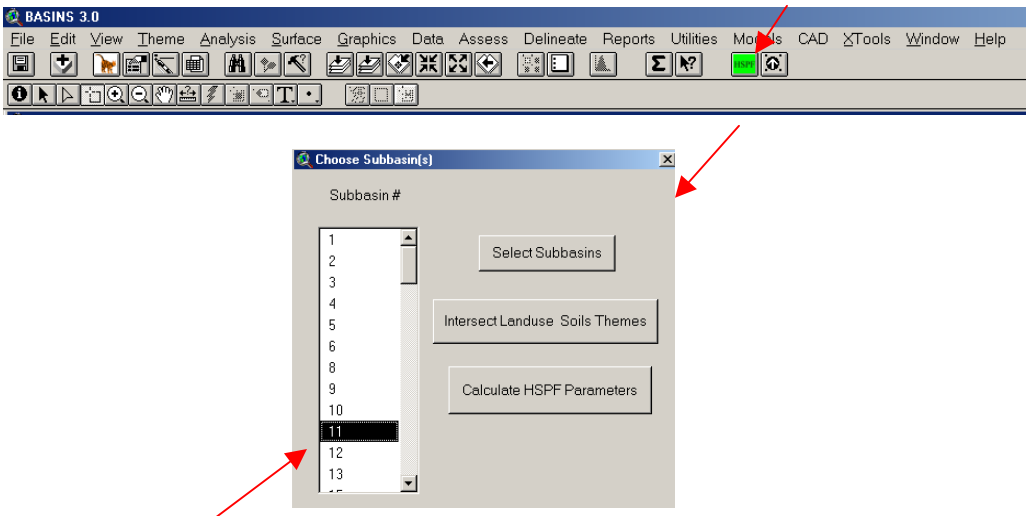
Land Use Category List

AGRICULTURAL LAND
AIR AND SHIPPING
CEMETERY
COMMERCIAL
FOREST
GOVERNMENTAL INSTITUTIONAL
HIGH DENSITY RESIDENTIAL
INDUSTRIAL
LANDFILLS
LOW DENSITY RESIDENTIAL
MEDIUM DENSITY RESIDENTIAL
MULTI-FAMILY/MOBILE HOME
OPEN LAND
OPEN WATER
RAIL
RECREATIONAL
ROADWAYS/PARKING
UTILITIES
WETLANDS
SUBURBAN DENSITY RESIDENTIAL

Step 9: When finished editing the land use text, select **Table**, **Stop Editing** from the menu bar and click **YES** to save edits. You have now changed the land use.



Step 10: Click the green HSPF button to open the "Choose Subbasin(s)" dialog box.

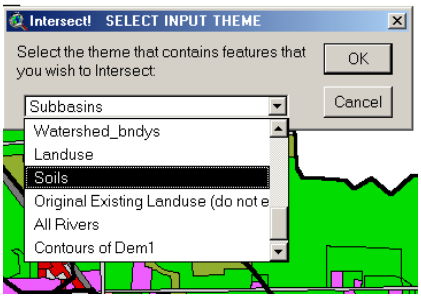


Step 11: Select (by clicking) the subbasin numbers that correspond to the land use areas just changed. Select more than one subbasin by holding the shift button and selecting the number.

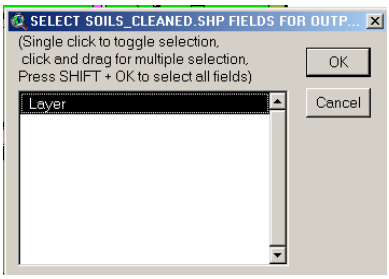
Step 12: Click the "Select Subbasins" button, this will select the desired subbasins from the land use theme.

Step 13: When the selection process is completed, click the "Intersect Landuse and Soils Themes" button.

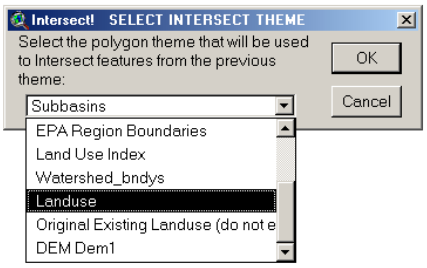
Step 14: In the first dialog box that appears, select the Soils theme and click **OK**.



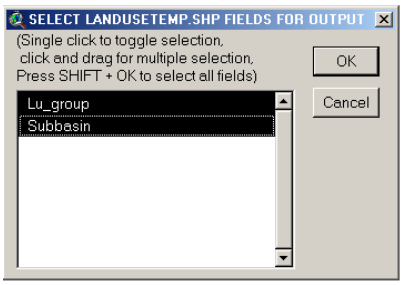
Step 15: In the next box, select all fields that appear (i.e. Layer), and click **OK**.



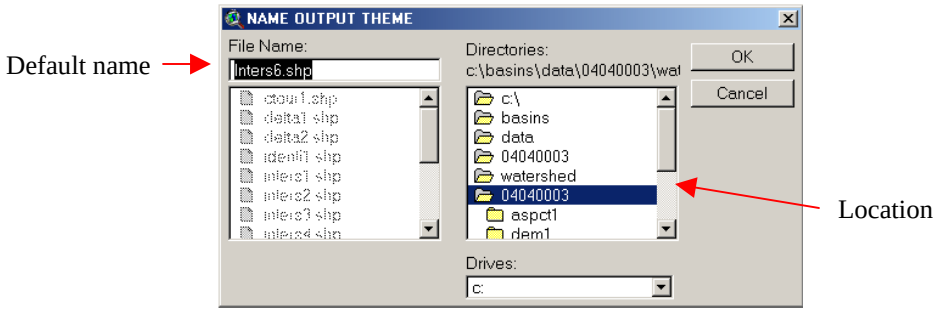
Step 16: In the next box, select the "Landuse" theme and click **OK**.



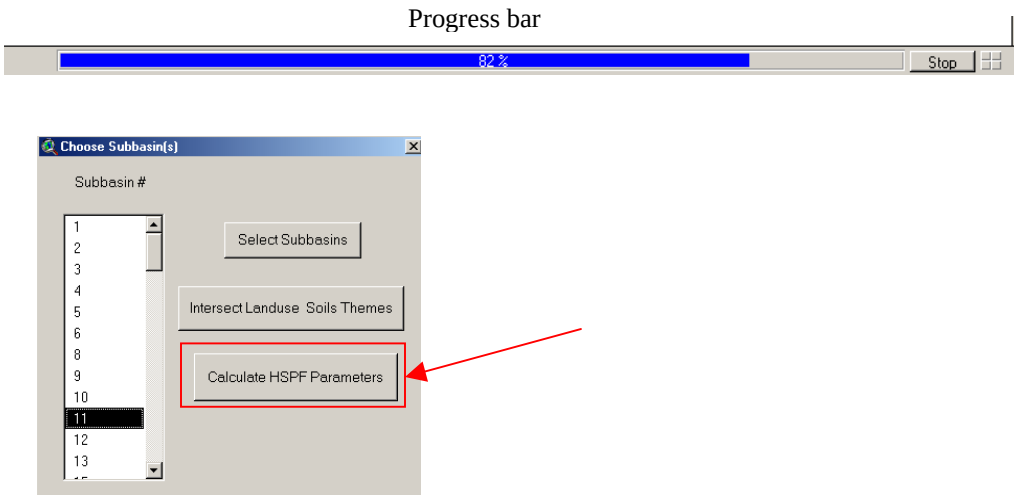
Step 17: In the following box, select all fields that appear (i.e. Subbasin & Lu_group) and click **OK**.



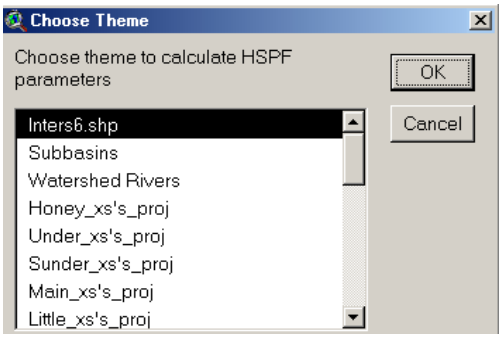
Step 18: A dialog box will now open asking you to specify the name of the new theme that will be created by the intersection of the soils and land-use themes. You can either use the default name or specify your own, as well as the location to save the file. Click **OK** when finished.



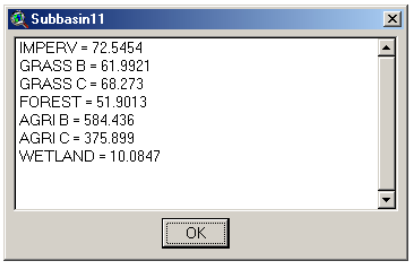
Step 19: Once the intersect process is completed (you can track its progress by watching the progress bar in the lower right-hand part of your screen), click the "Calculate HSPF Parameters" button to calculate the area values needed for the HSPF input file.



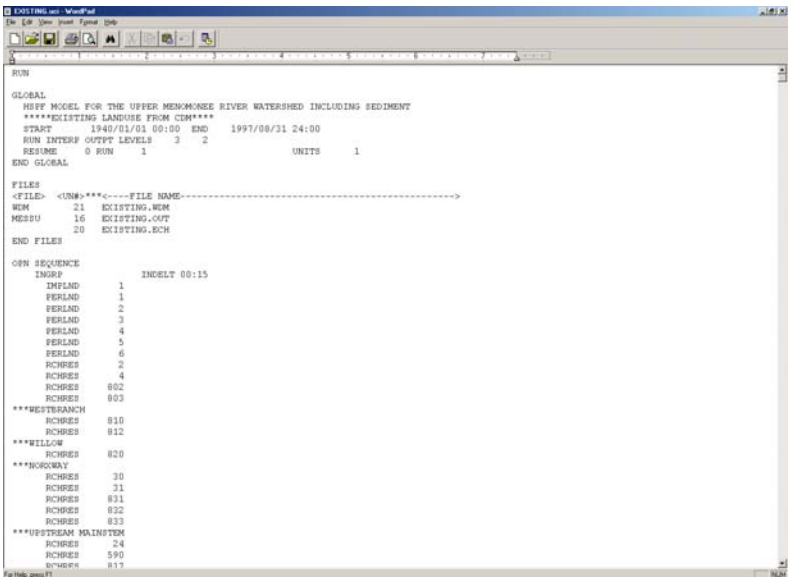
Step 20: In the dialog box that appears, select the file created in Step 17 and click **OK**.



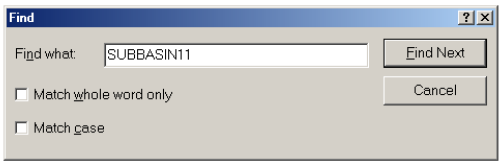
Step 21: The results for each subbasin will be output to a message box. Retain these values for input into the HSPF .uci file (i.e. copy values to a file or write them down on scratch paper). If parameters were calculated for more than one subbasin, click **OK** in the message box to bring up the next values for the next subbasin.

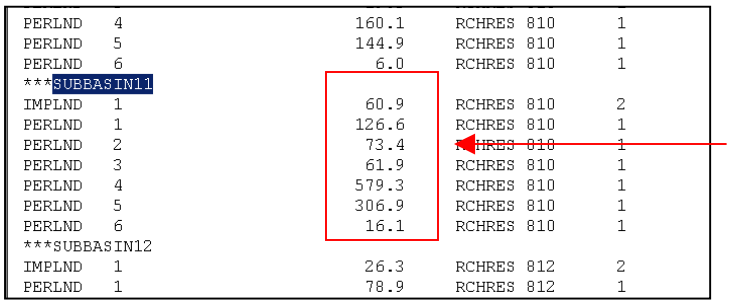


Step 22: Open the HSPF .uci (i.e. EXISTING.uci) file in any text editor or word processing program to apply land use changes.



Step 23: Search for the following string: **SubbasinX** , where X is the subbasin number. (It will be located in the SCHEMATIC block.)



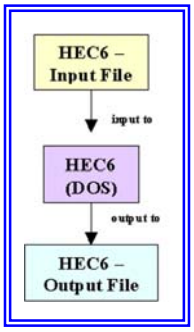

PERLND 4 160.1 RCHRES 810 1
PERLND 5 144.9 RCHRES 810 1
PERLND 6 6.0 RCHRES 810 1
***SUBBASIN11
IMPLND 1 60.9 RCHRES 810 2
PERLND 1 126.6 RCHRES 810 1
PERLND 2 73.4 RCHRES 810 1
PERLND 3 61.9 RCHRES 810 1
PERLND 4 579.3 RCHRES 810 1
PERLND 5 306.9 RCHRES 810 1
PERLND 6 16.1 RCHRES 810 1
***SUBBASIN12
IMPLND 1 26.3 RCHRES 812 2
PERLND 1 78.9 RCHRES 812 1
Values to change

Step 24: Change the values for IMPLND 1 and PERLND 1-6 to the new corresponding values from ArcView, being sure to retain the format (i.e. column spacing, etc.) of the file.

IMPERV = IMPLND1
GRASSB = PERLND1
GRASSC = PERLND2
FOREST = PERLND3
AGRIB = PERLND4
AGRIC = PERLND5
WETLAND = PERLND6

Step 25: Rerun HSPF with the new land use parameters.

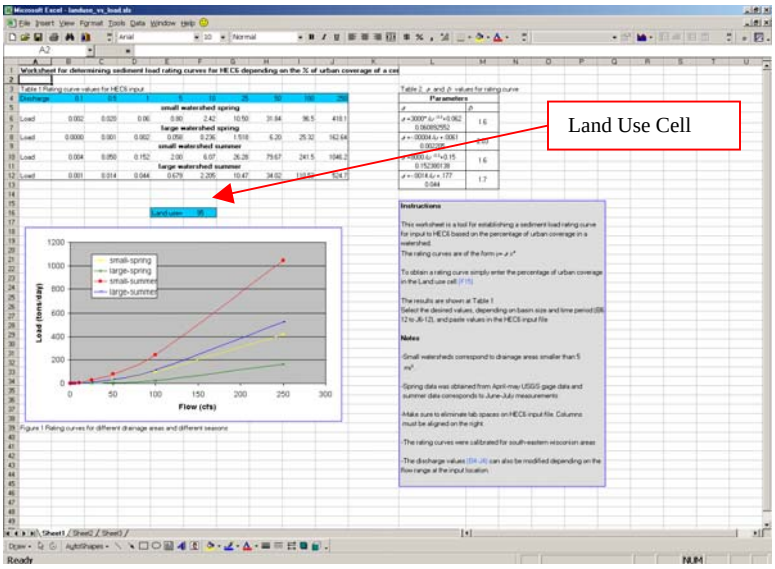
XIII. MODIFY SEDIMENT DATA IN HEC-6 USING SEDIMENT LOADING FUNCTIONS



Use these instructions to determine the correct sediment rating curves for the HEC-6 input file based on the percentage of urban coverage in the watershed. The rating curves are of the form $y=ax^b$ where the coefficients a and b are dependent on land use, basin size and season.

Step 1: Open "landuse_vs_load.xls" in Microsoft Excel. This file is located on the Menomonee CD in the "HEC6" folder.

Step 2: Enter the percentage of urban coverage in the land use cell (F15) and hit return. This will cause the values in Table 1 to change according to the specified urban percentage.



Step 3: Table one displays sediment load values for different basin sizes and seasons. Select the sediment load values depending on the basin characteristic and replace at the corresponding input location from the HEC6 input file.

3	Table 1 Rating curve values for HEC6 input									
4	Discharge	0.1	0.5	1	5	10	25	50	100	250
5					**small watershed spring**					
6	Load	0.002	0.020	0.06	0.80	2.42	10.50	31.84	96.5	418.1
7					**large watershed spring**					
8	Load	0.0000	0.001	0.002	0.058	0.236	1.518	6.20	25.32	162.64
9					**small watershed summer**					
10	Load	0.004	0.050	0.152	2.00	6.07	26.28	79.67	241.5	1046.2
11					**large watershed summer**					
12	Load	0.001	0.014	0.044	0.679	2.205	10.47	34.02	110.52	524.7

men_97A.dat - WordPad

File Edit View Insert Format Help

```
EJ
T4      MENOMONEE RIVER MAIN BRANCH
T5      SEDIMENT DATA
T6      BED SEDIMENT DATA FROM USGS WATER RESOURCES DATA FOR WISCONSIN
T7      USING BED DATA AVERAGED FROM 1975-1977
T8      NO INFLOW SEDIMENT LOAD
I1            20       0                                  2       1
I3  SILT       1       1       4       0       0       0       0       0
I4  SAND      14       1      10       0       0       0       0     110
LQ     Q     0.1     0.5     1.0     5.0      10      25      50     100     250
LT TOTAL  0.0001   0.001   0.005   0.144   0.588   3.776   15.42   62.98  404.57
LF SILT1    .206    .206    .206    .206    .206    .206    .206    .206    .206
LF SILT2    .174    .174    .174    .174    .174    .174    .174    .174    .174
LF SILT3    .141    .141    .141    .141    .141    .141    .141    .141    .141
LF SILT4    .099    .099    .099    .099    .099    .099    .099    .099    .099
LF   VFS     .14     .14     .14     .14     .14     .14     .14     .14     .14
LF    FS     .21     .21     .21     .21     .21     .21     .21     .21     .21
LF    MS     .03     .03     .03     .03     .03     .03     .03     .03     .03
LF    CS       0       0       0       0       0       0       0       0       0
LF   VCS       0       0       0       0       0       0       0       0       0
LF   VFG       0       0       0       0       0       0       0       0       0
LF    FG       0       0       0       0       0       0       0       0       0
```

HEC-6 input file

Notes

- Small watersheds correspond to drainage areas smaller than 5 mi^2
- Spring data was obtained from April-may USGS gage data and summer data corresponds to June-July measurements
- Make sure to eliminate tab spaces on HEC-6 input file. Columns must be aligned on the right.
- The rating curves were calibrated for south-eastern Wisconsin areas
- The discharge values (B4-J4) can also be modified depending on the flow range at the input location.

MENOMONEE RIVER WATERSHED SEDIMENT TRANSPORT MODELING SYSTEM FLOW CHART